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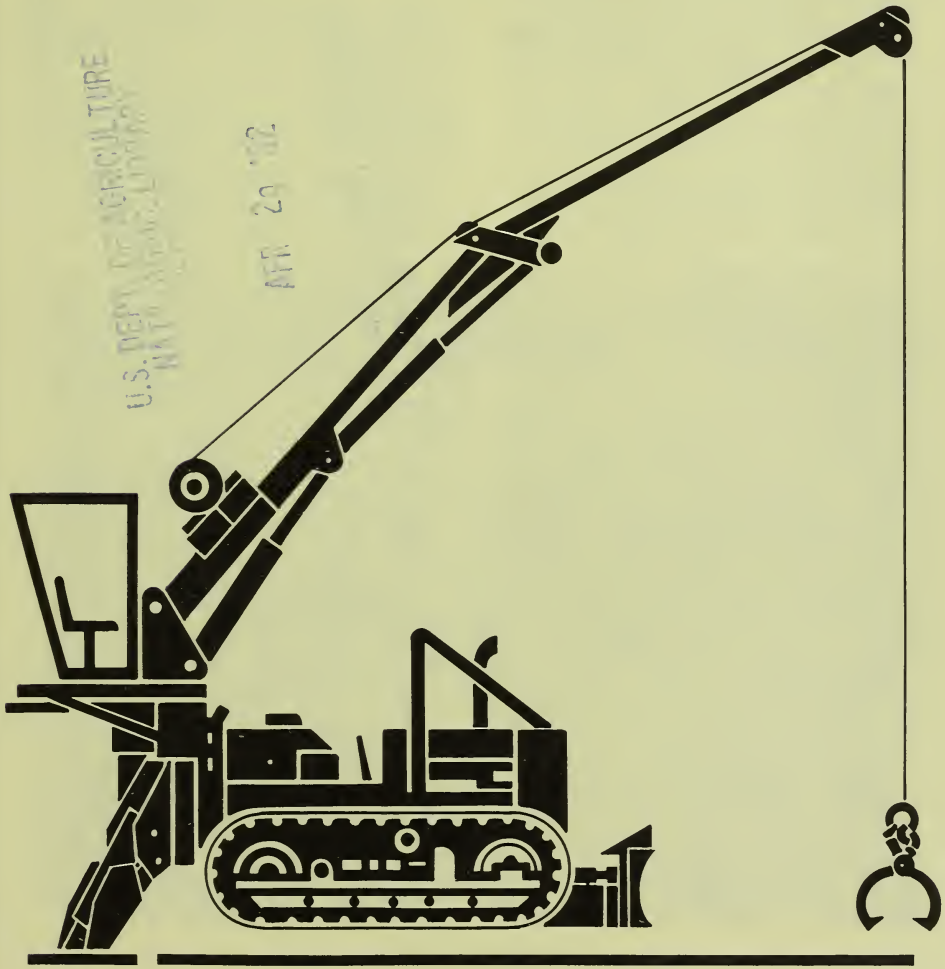
Harvesting on Rough Terrain with the Appalachian Thinner



The Appalachian Thinner is a prototype of a cable yarding machine developed by the USDA Forest Service for harvesting small areas with a relatively low volume of timber.

The designers wanted a machine that was highly mobile, had a low initial cost, and would operate efficiently in small timber on steep Appalachian terrain. To meet this criteria, they assembled a knuckle-boom attachment with a single drum Gearmatic GH-85 hydraulic winch mounted on the back of a John Deere 450 Crawler tractor.

This arrangement proved to be quite efficient in sawlog removal. In a typical operation, the system is capable of falling, yarding, bucking, and decking forty tree-length logs in an eight-hour day. The machine moves from one setting to the next in five minutes, compared to 30 minutes or more for cable machines requiring guylines. This mobility makes the machine very attractive for harvesting small woodlands and steep slopes. In addition, few mechanical problems have been reported with the Thinner.

How it Works

The Thinner is easily assembled and operated. The hydraulic winch, which is mounted on the main boom contains 1500 feet of 3/8-inch diameter cable and is set for a maximum pull of 8000 pounds. The knuckle-boom is joined to the crawler tractor by a simple connection that can be attached or detached in 15 minutes.

Researchers chose the John Deere 450 Crawler for their prototype design because of its popularity for woods application. In a commercial version of the Thinner, any crawler tractor could be substituted. The most convenient type would be one intended for use with a backhoe.

For sawlog removals and clearcut harvests, the yarder can be used with tongs. In sanitation thinnings a sliding choker can be used in addition to the tongs.

A typical cycle of operation for the Thinner begins with a chaser hauling the tongs downhill as the yarder operator releases cable from the winch drum. Due to the controlled drag of the cable afforded by a power-off feature, the chaser can keep his balance even on 70 percent slopes.

When halfway to the log, the chaser passes the tongs to a choker-setter, who continues to the log and attaches the tongs. The choker-setter then signals the yarder operator on a radio and the log begins its trip uphill.

The logs are topped and limbed to a minimum diameter of eight inches and are hauled out tree-length. They are bucked at the landing to 16 foot lengths. Felling is concurrent with yarding. This system eliminates problems that occur when logs are yarded through slash and tops.

The tongs should be hooked across the front of the log. This minimizes the pull required to move the log and reduces the number of hangups that occur during yarding, since the tongs and log will tend to ride around any obstacles they encounter. Once the log is landed, the tongs should be reset at ground level before bucking. For decking, the tongs are placed at the center of gravity and the logs are swung into place.

What It Can Do

The machine has good swing capability which facilitates decking logs on the upper slope of the road. The equipment could be used for loading log trucks but it has not yet been tested in this mode.

Researchers have tried using the machine to thin small diameter material, hauling two or three stems at a time. The initial results were not promising. The stand in question was thick with rhododendron, which hindered the yarding process. In subsequent trials, small material will be thinned in rows.

The amount of work that can be done with the Thinner varies directly with the size of the log. If the tree-length logs were not bucked and decked, but merely yarded to the landing and swung away with another machine, production could be increased to 60 stems per day.

The Thinner has been timed working in a clearcut and a sanitation thinning. The average times observed in the clearcut were:

outhaul and inhaul	3.5 minutes
landing, bucking, and decking	3.9 minutes
delays	1.8 minutes
TOTAL	9.2 minutes

The maximum stem volume of the pieces hauled was 500 board feet; the average was 180 board feet or 31 cubic feet. The maximum yarding distance was 400 feet; the average, 170 feet.

During yarding, the Thinner is placed perpendicular to the road. Both the outriggers and the dozer blade are lowered, lending excellent stability and

eliminating the need for guylines.

In a sanitation thinning, observers recorded the following average times for the Thinner:

outhaul and inhaul	4.8 minutes
landing, bucking, and decking	5.2 minutes
delays	2.7 minutes
TOTAL	12.7 minutes

An average stem volume of 67 board feet or 21 cubic feet was recorded. The average yarding distance was 160 feet. The Thinner consumed about one gallon of diesel fuel per 1000 board feet of production.

Mechanically, the Thinner has been virtually trouble-free. No problems have been reported with the hydraulic system. One modification was implemented: the mechanical coupling between the knuckle-boom and the crawler was modified to increase the size of the knockout pins. The only major mechanical improvement being considered is

the addition of a haulback line, so that haulback could be mechanically achieved.

Who To Contact

The Appalachian Thinner was conceived and designed by Cleveland J. Biller, research mechanical engineer with the USDA Forest Service, Northeastern Forest Experiment Station, at the Forest Sciences Laboratory, 180 Canfield Street, Morgantown, WV 26505. Project leader for the Hardwood Timber Harvesting research unit is Penn A. Peters. The phone number for engineering research is 304-599-7483.

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Northeastern Forest Experiment Station
370 Reed Road
Broomall, PA 19008